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MAGIC Subregion
Transportation Issues Paper

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Draft

MAGIC Subregion
Transportation Issues Paper

Prepared by
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August 1989

This report, number TS/89-14, was financially supported by the Massachusetts Department of Public Works (Contract # 89203) and the Urban Mass Transportation Administration (Contract #MA-08-151). The report reflects the views of the Metropolitan Area Planning Council. The recommendations in the report do not necessarily reflect the position of the Executive Office of Transportation and Construction, the Massachusetts Department of Public Works or the Urban Mass Transportation Administration.

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I. HIGHWAYS

The MAGIC sub-region comprises ten contiguous communities in the Northwest corner of the MAPC planning region. The towns that make up the MAGIC subregion are Acton, Boxborough, Carlisle, Concord, Hudson, Littleton, Maynard, Stow, Sudbury, and the City of Marlbourgh.

Principal access corridors into this subregion are US Route 20, Interstates 495 and 290, and State Route 2. Within the subregion secondary transportation corridors include Routes 2A, 27, 62 85, 110, 111, 119 and 225. Available data suggests that roadway capacity has been exceeded along these corridors.

The data presented in this paper on traffic volume, safety and congestion was collected by MAPC from available traffic studies for the subregion. Sources include environmental impact reports, the MDPW high accident location list and reports prepared by MAPC for communities in the subregion.

ROUTE 2

Route 2 is the primary east-west highway serving the MAGIC subregion. This highway links Acton, Concord, and Littleton to Interstate 495 and Route 128 in grade separated interchanges (Exhibit 1). Route 2 merges with Route 111 or Massachusetts Avenue in Acton and is also coterminous with Route 2A in portions of Concord. One of the problem locations along this corridor is the Route 2/Cambridge Turnpike intersection which serves 36,750 vehicles a day with delays of up to 43 seconds and an associated level of service E in the a.m. and p.m. peak hours. The annual accident average at this intersection is 28. Another problem location on Route 2, that is of particular concern to Concord officials, is the Reformatory Traffic Circle which experiences 100 accidents annually. Serious consideration should be given to Route 2 to enhance its level of service and safety to motorists.

ROUTE 2A

Route 2A is also generally an east-west highway. This highway is laid out over portions for the historic Battle Road linking Lexington and Concord. As the Great Road in Acton, Route 2A serves as a commercial roadway with a number of curb cuts to fast food restaurants and other high volume retail locations. The road capacity and safety suffers from the free access that it provides to abutting parcels. Other development along Route 2A include office developments in Acton, Littleton and Lincoln near the Lincoln/Concord town line. Major congestion points along Route 2A are the intersections with Route 27 in Acton and Interstate 495 in Littleton These intersections' level of service are "F" during most peak hours.

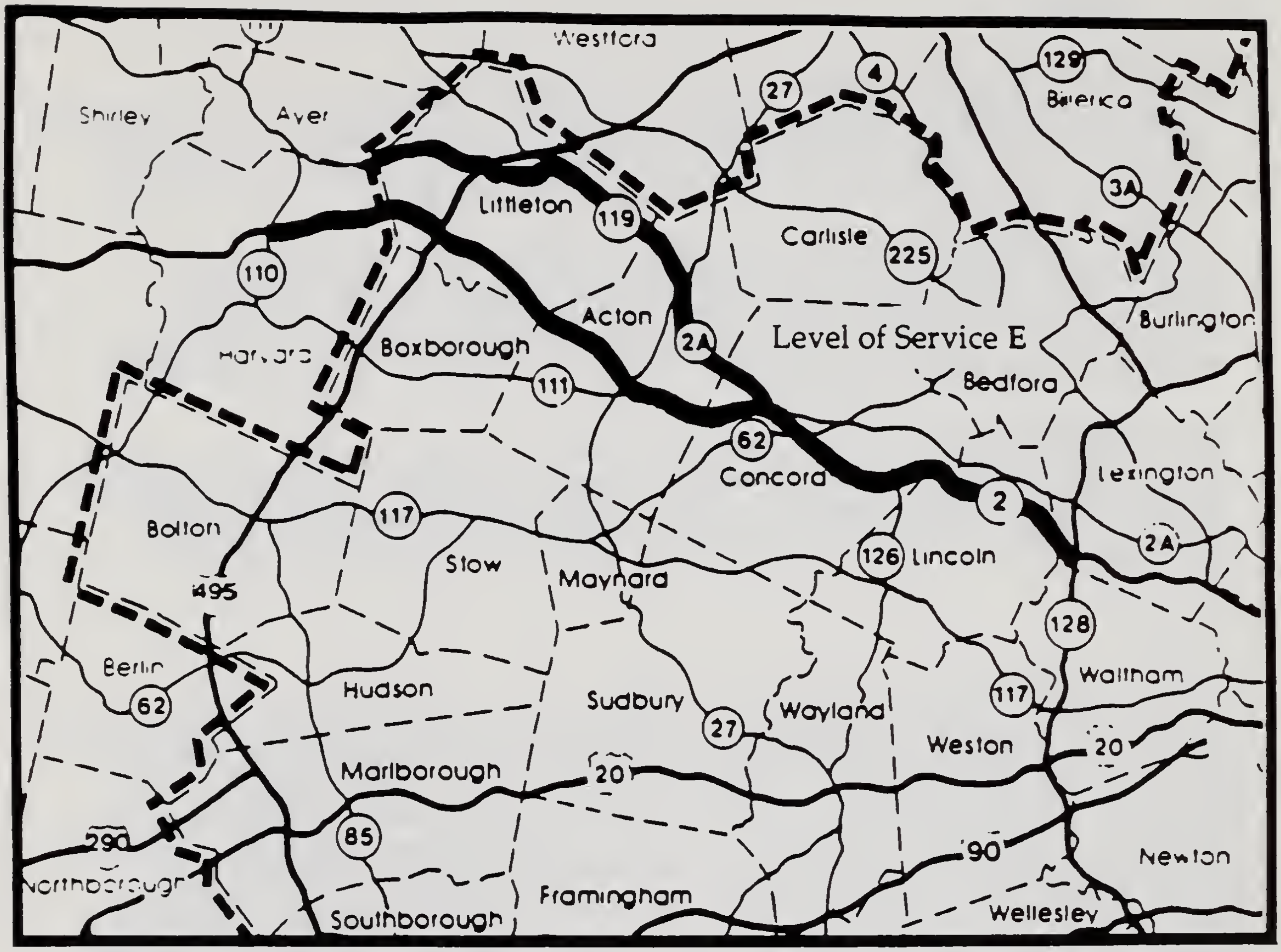


Exhibit 1
Routes 2 and 2A

INTERSTATE 495

Interstate 495 (Exhibit 2) constitutes an outer beltway which provides access to communities on the Boston metropolitan fringe. I-495 provides an alternative for north and south bound commuters who would otherwise utilize Route 128, thereby reducing the congestion on the latter. Safety and capacity limitations/constraints on Interstate 495 have been identified at three locations. These are the I-495/Route 111 (Massachusetts Avenue) interchange in Boxborough, the I-495/Route 110 (Great Road) interchange in Littleton and the Route 2A interchange also in Littleton.

The I-495/Route 111 interchange serves 11,060 vehicles a day at a level of service "F" while the I-495/Route 110 interchange operates at a level of service "E". Both of these indices indicate very high levels of congestion and delay. Improvements are needed to upgrade these to an acceptable LOS. There is no indication that these intersections are hazardous and unsafe.

ROUTE 20

Studies suggest that this corridor is by far the greatest source of concern in the subregion. Route 20, also known as the Boston Post Road (Exhibit 3), serves the communities of Marlborough and Sudbury. In Marlborough, there are about 20 intersections that contribute significantly to the operational failure of the entire corridor. Excessive delays due to left turning vehicular movements are present in this area. Obstruction to through traffic due to these left turns have resulted in levels of service "E" and worse. Often, the volume-to-capacity ratios are in excess of 1.00 and Average Daily Traffic (ADT) volumes range from 18,150 vehicles at the Route 20/Wayside Inn/Hager Street intersection to 22,400 vehicles per day at the Union Avenue/Route 20 intersection. The entire stretch of Route 20 from the Concord Road intersection to the Union Street intersection has become unserviceable. An alternative route may need to be found in order to restore the level of service to an acceptable condition.

In Sudbury, the conditions under which Route 20 operates are no better than in Marlborough. Between the Wayside Inn Road to the southwest and Goodman's Hill Road to the north-east there are several major signalized intersections serving from 19,900 vehicles a day at Goodman's Hill Road to about 22,400 vehicles per day at Wayside Inn Road. None of these intersections currently operates at a better level of service than "D".

Delays range from 26 seconds at the Dudley Road intersection to 97 seconds for west bound traffic at the Concord Road intersection. Though relatively low, the annual average of 3 accidents at Nobscot Road to the 8 accidents at the Union Street intersection may not be a true reflection of the frustration that motorists experience along this corridor. Available data suggest that the entire stretch of Route 20 has failed from a transportation point of view. It may be significant to observe that studies on the Route 20 corridor which recommend signalization, road

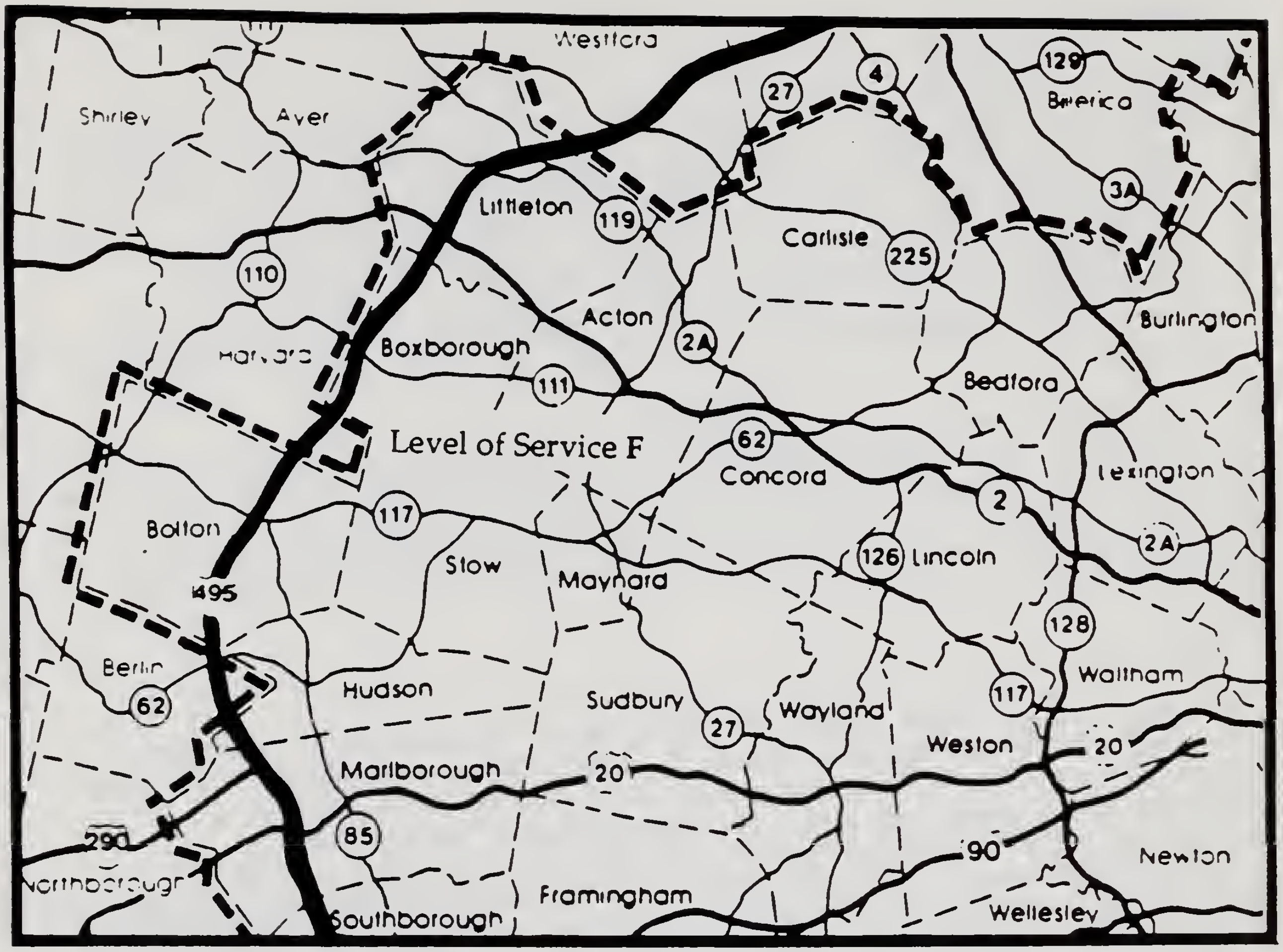


Exhibit 2
Interstate 495

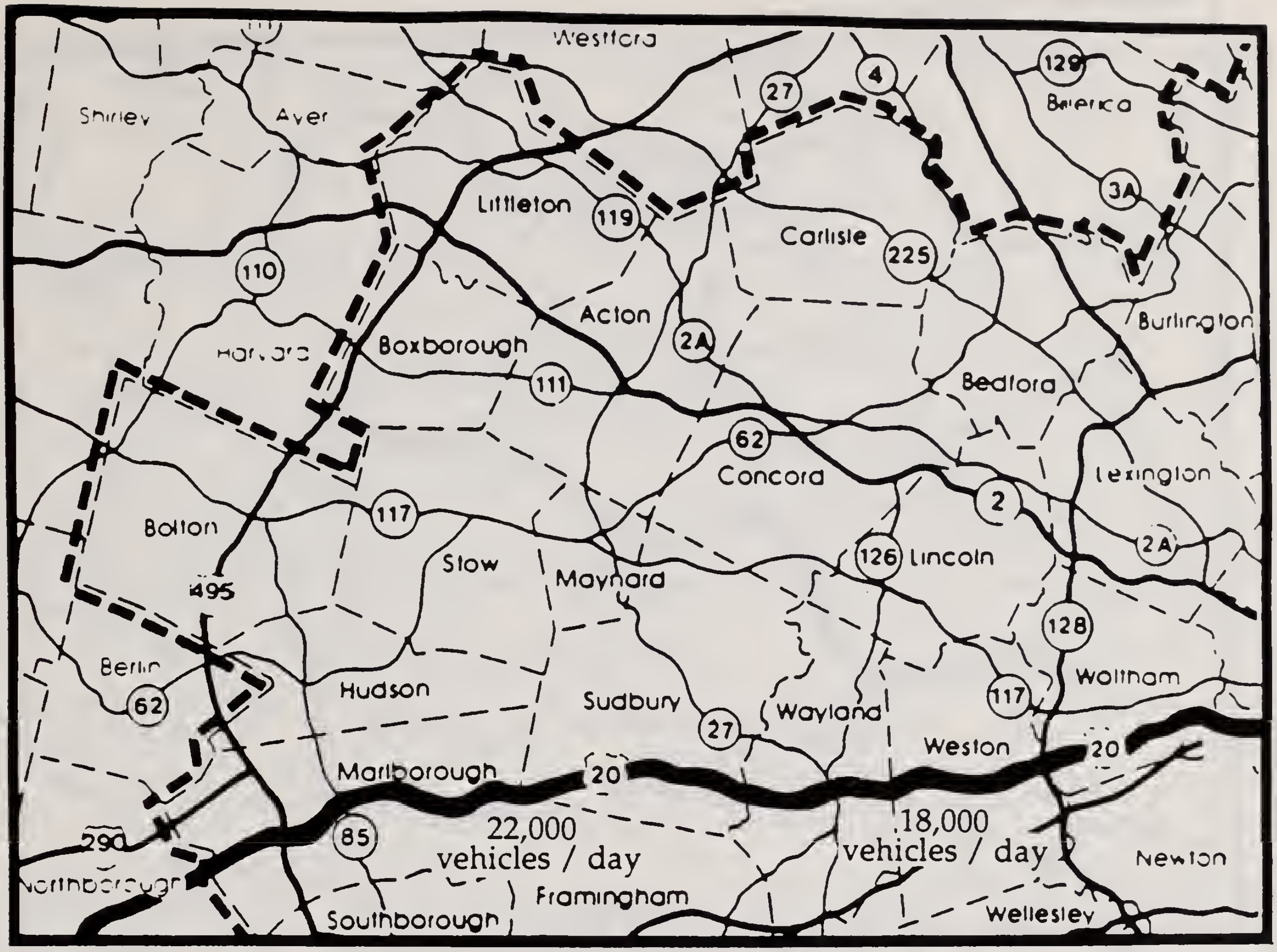
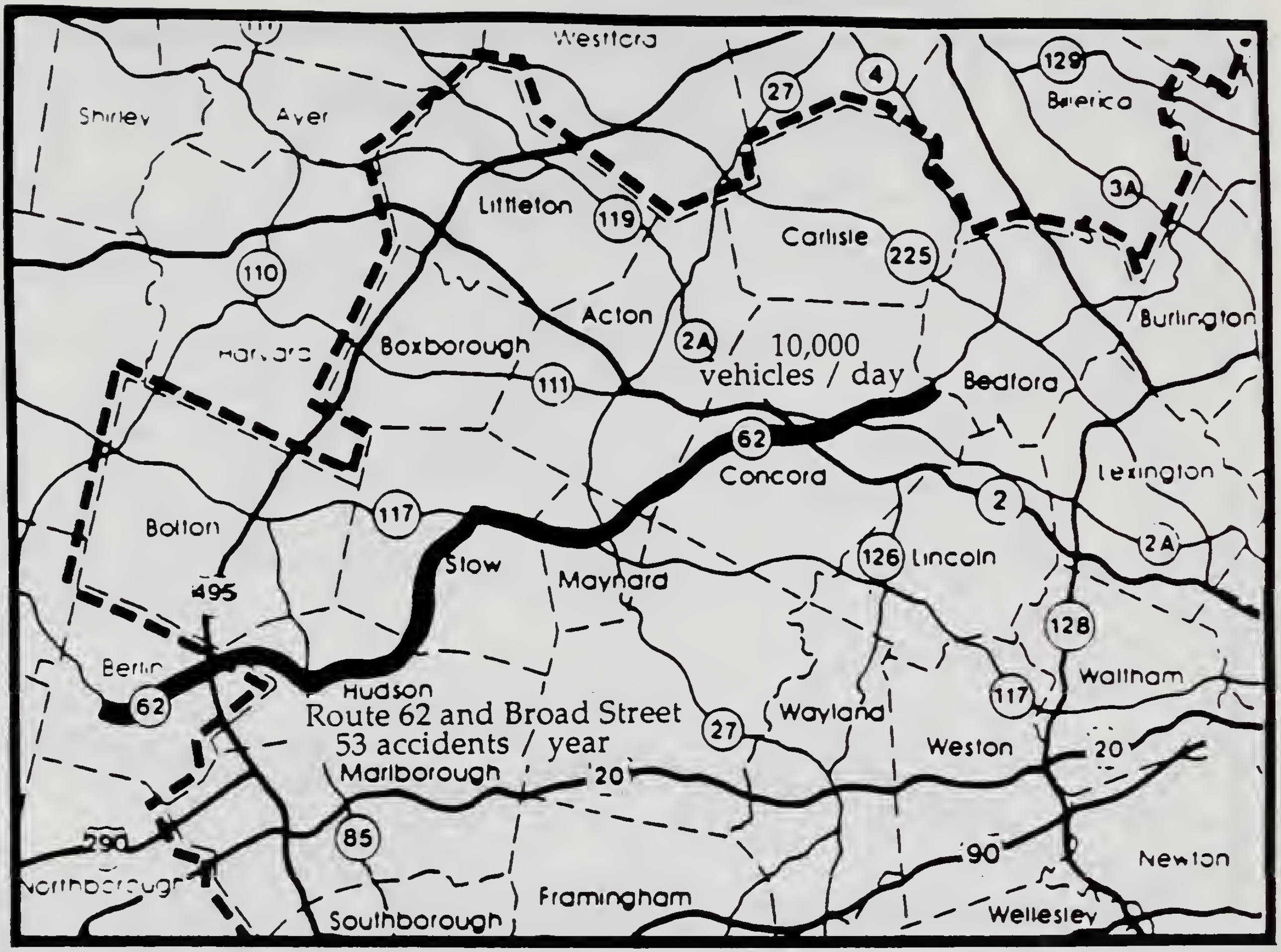


Exhibit 3
Route 20



10,000
vehicles / day

Route 62 and Broad Street
53 accidents / year

Exhibit 4
Route 62

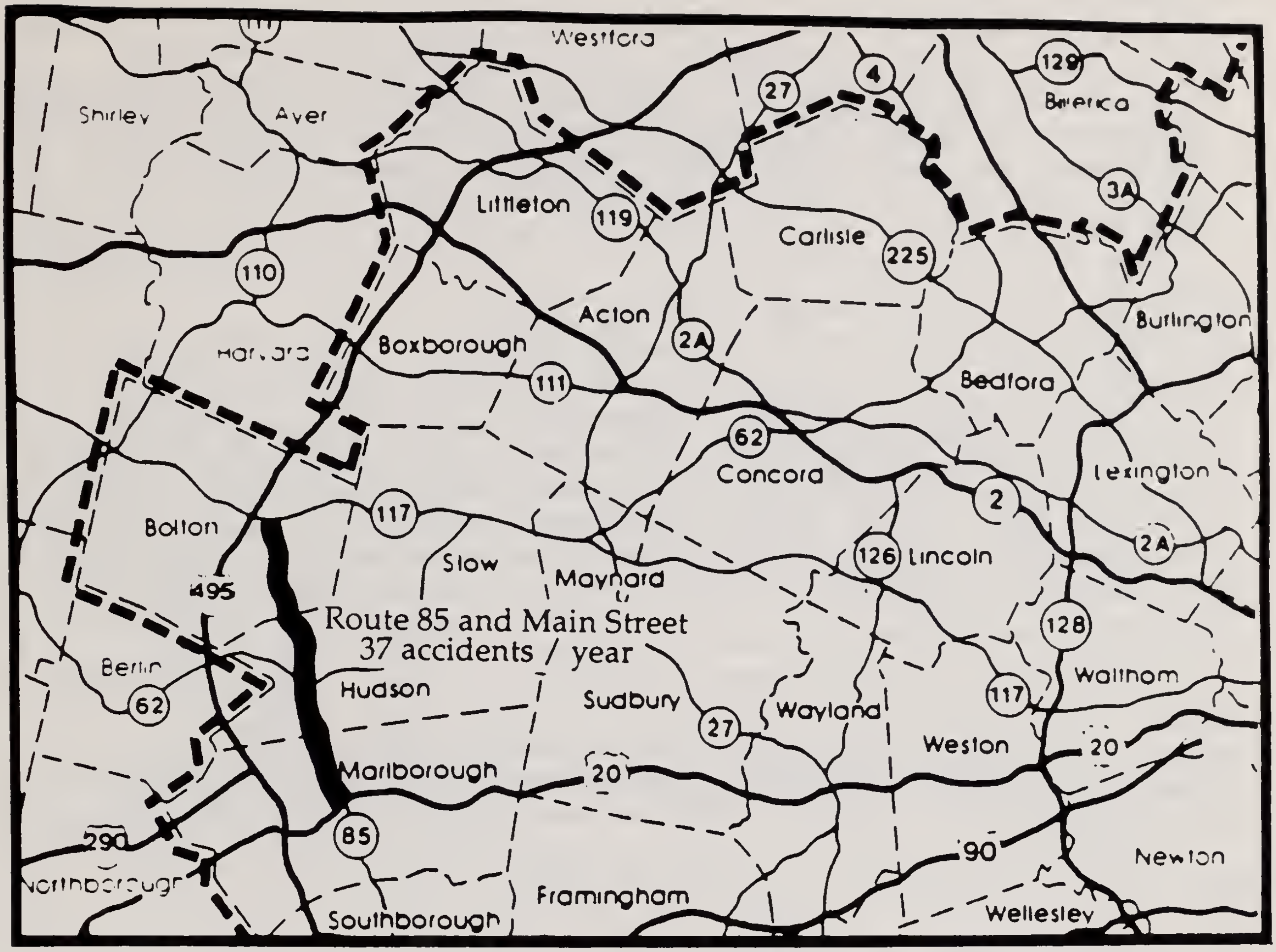


Exhibit 5
Route 85

widening and channelization as solutions for improving the level of service along various stretches of this corridor and at intersections do not appear to have yielded the anticipated results. The Route 20 corridor is an instance of saturation brought about by exclusive attention to improvements to the primary roadway and possibly the omission of improvements to feeder roads and alternative routes.

ROUTE 62

Route 62 is considered to be a significant highway in the MAGIC subregion. The route serves four MAGIC communities; Concord, Maynard, Stow and Hudson (Exhibit 4) and is used heavily as a mean of avoiding congestion on Routes 3 and 128. Route 62 in Concord (known as Old Bedford Road) serves 10,350 vehicles per day and in Hudson (known as Main Street) serves an equal number of vehicles. Studies indicate there are safety and capacity concerns along various segments and intersections throughout the entire corridor. Delays of up to 37 seconds between Merriam's Corner and Bedford Street in Concord, a distance of about one half mile, suggest a high level of congestion. An annual accident average of 53 at its intersection with Broad and Manning streets, in Hudson, make this segment of Route 62 and high hazard zone for motorists. Other intersections, at Church Street and Hougton Street, with 6 and 19 annual accidents respectively, make safety of motorists of primary importance along this segment of the Route 62 corridor. Community officials have also stated concern for future increased congestion in this corridor due to continued development.

ROUTE 85

Bolton Street (Route 85) in Marlborough is another corridor in dire need of improvements in the MAGIC subregion highway system. From its intersection with Route 117 in Bolton, Route 85 goes south, intersecting Route 62 and Interstate 290 in Hudson and Route 20 in Marlborough (Exhibit 5). In Hudson, the Route 85/School/Park Streets intersections recorded an annual average of 10 accidents. The Route 85/South Street intersection had 9 annual average accidents. The Route 85/Main/Felton/Central Streets intersection, also in Hudson had an annual average of 37 accidents thus making it the most hazardous location along this segment of the corridor. Such a relatively high accident average when considered in light of the 3800 vehicles served by this intersection suggest problems of geometry and signage.

In Marlborough, the two congested areas are the segment from Hudson Street to Union Street which serves 14,458 vehicles a day at a level of serve "E" and the Route 85/I-290 Connector intersection which operates at a level of service "F" and serves 4100 vehicles in peak hours.

Other congested locations include the Route 85 intersections with Reservoir Street (Marlborough), LOS E; Broad Street (Hudson), LOS F; and the Hudson Rotary.

ROUTE 110

Route 110, known as Kings Road in Littleton, is a minor arterial highway (Exhibit 6). For a substantial segment of its length the traffic on Route 110 is well within its capacity except at its intersection with the Great Road where it serves a traffic volume which exceeds its design capacity by over 50%. Nevertheless, its level of service varies from "D" at the Kings Road/Roger Street intersection to "E" at its Meetinghouse Road/Adam Street intersection.

ROUTE 225

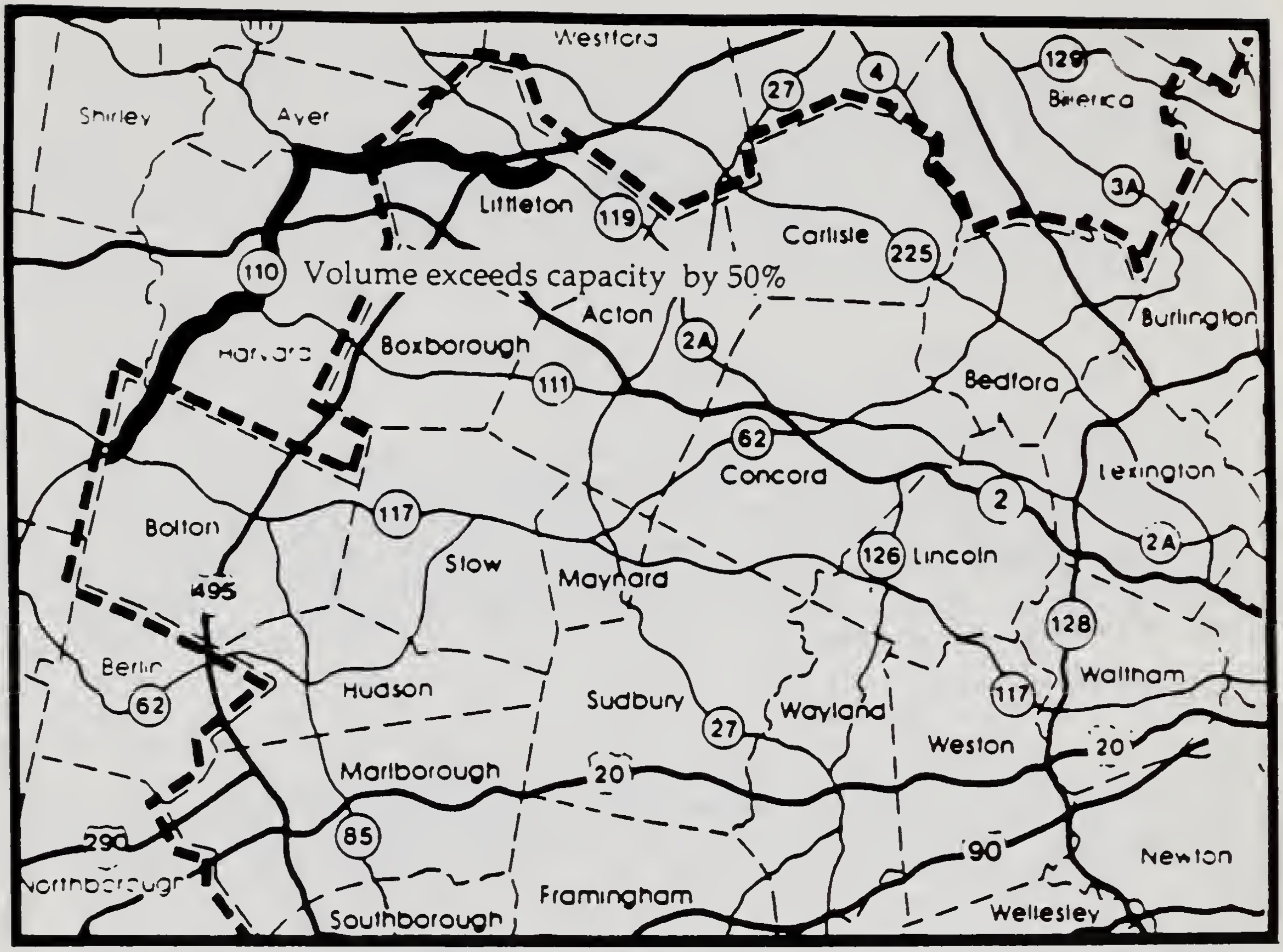
Route 225 is known as both Westford Street and Bedford Road in Carlisle. The highway connects Interstate 495 in Westford to Route 128 in Lexington. Route 225 carries approximately 8,000 vehicles per day in Carlisle. South of the MAGIC subregion, Route 225 connects with Route 4 to carry traffic volumes in excess of 50,000 vehicles daily. Congestion problems exist on Route 225 in Carlisle in the vicinity of School Street and also at Lowell Street.

INTERSTATE 290

This corridor originates in Hudson and travels west (Exhibit 7). It intersects I-495 in Marlborough and Route 85 in Hudson. Capacity concerns along I-290 are limited to its Connector along its segment between Bolton and Fitchburg Streets in Marlborough and at its intersection with Route 85. I-290 at Fitchburg Street serves as many as 29,910 vehicles per day and is operating at a level of service "D". Bolton Street at the I-290 connector intersection is presently operating at LOS "D" with a low average of 4 accidents a year. The intersection of the I-290 connector and Route 85 currently operates at a level of service "F" during peak periods.

ROUTE 27

This is essentially a north to south highway linking the communities of Sudbury, Maynard, Acton and Carlisle in the MAGIC subregion (Exhibit 8). One of its most crucial segments in Sudbury is the intersection of Old Sudbury Road and Concord Road. At this intersection average delays of 65 seconds or a LOS "E" has been recorded for vehicles traveling northbound with a slightly better LOS "D" and delays of 34 seconds for southbound traffic. Both conditions demand improvement measures to promote the economic growth along that corridor. The Route 27 intersection with Route 2A in Acton also suffers from congestion and experiences LOS "F" during most peak periods.



Volume exceeds capacity by 50%

Exhibit 6
Route 110

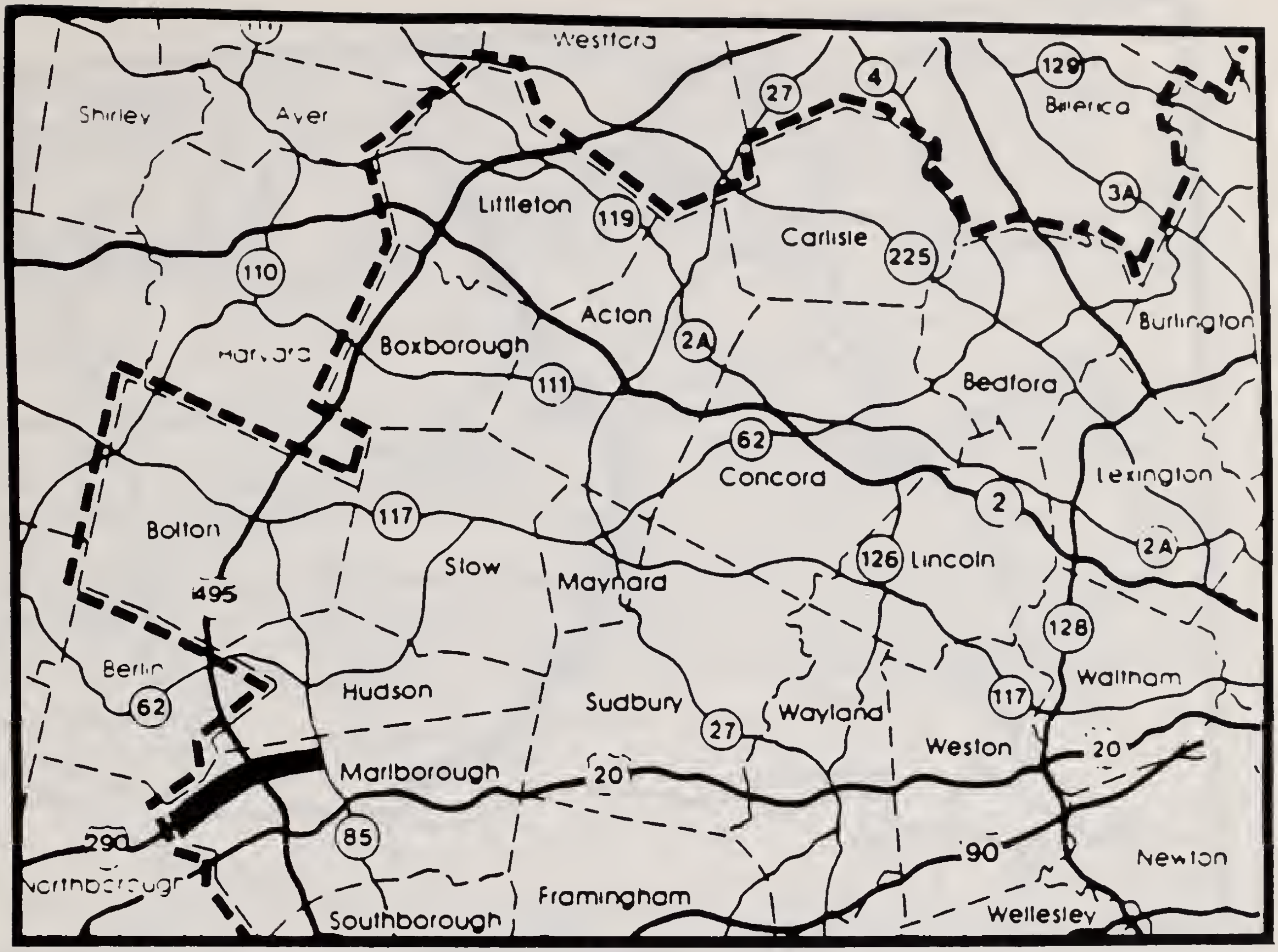


Exhibit 7
Interstate 290

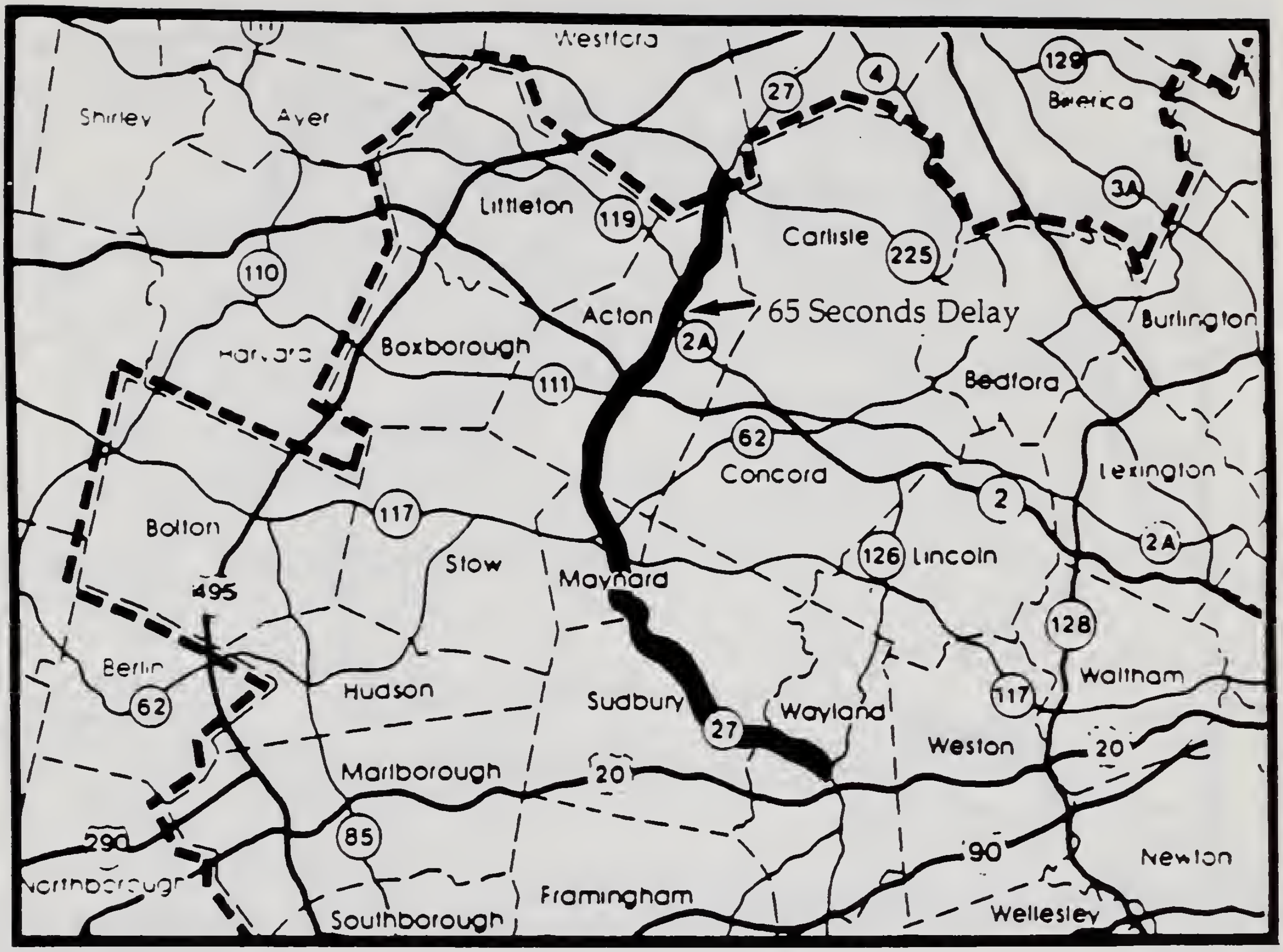


Exhibit 8
Route 27

ROUTE 111

Route 111 is also known as Massachusetts Avenue in the communities of Acton and Boxborough (Exhibit 9). It branches off Route 2 in a westerly direction into Boxborough where it meets and intersects I-495 at a grade separated interchange. This Route 111/I-495 interchange serves 11,060 vehicles per day and operates at an unacceptable level of service "F". Improvements need to be made to this location. Route 111 levels of service may be significantly impacted by a large office/industrial development that is occurring in Boxborough.

ROUTE 119

Route 119 (also called the Great Road or Route 2A) serves the communities of Acton and Littleton where it intersects Interstate 495 about a half mile north of the Littleton Common. Safety and capacity concerns are limited at the present to this intersection.

The Route 119/Route 110 (Great Road/Kings Street) intersection also in Littleton has and annual average of 9 accidents an operates at a level of service "E". Its volume-to-capacity ratio of 1.55 indicates that it has exceeded its design capacity by over 50% of its present traffic volume.

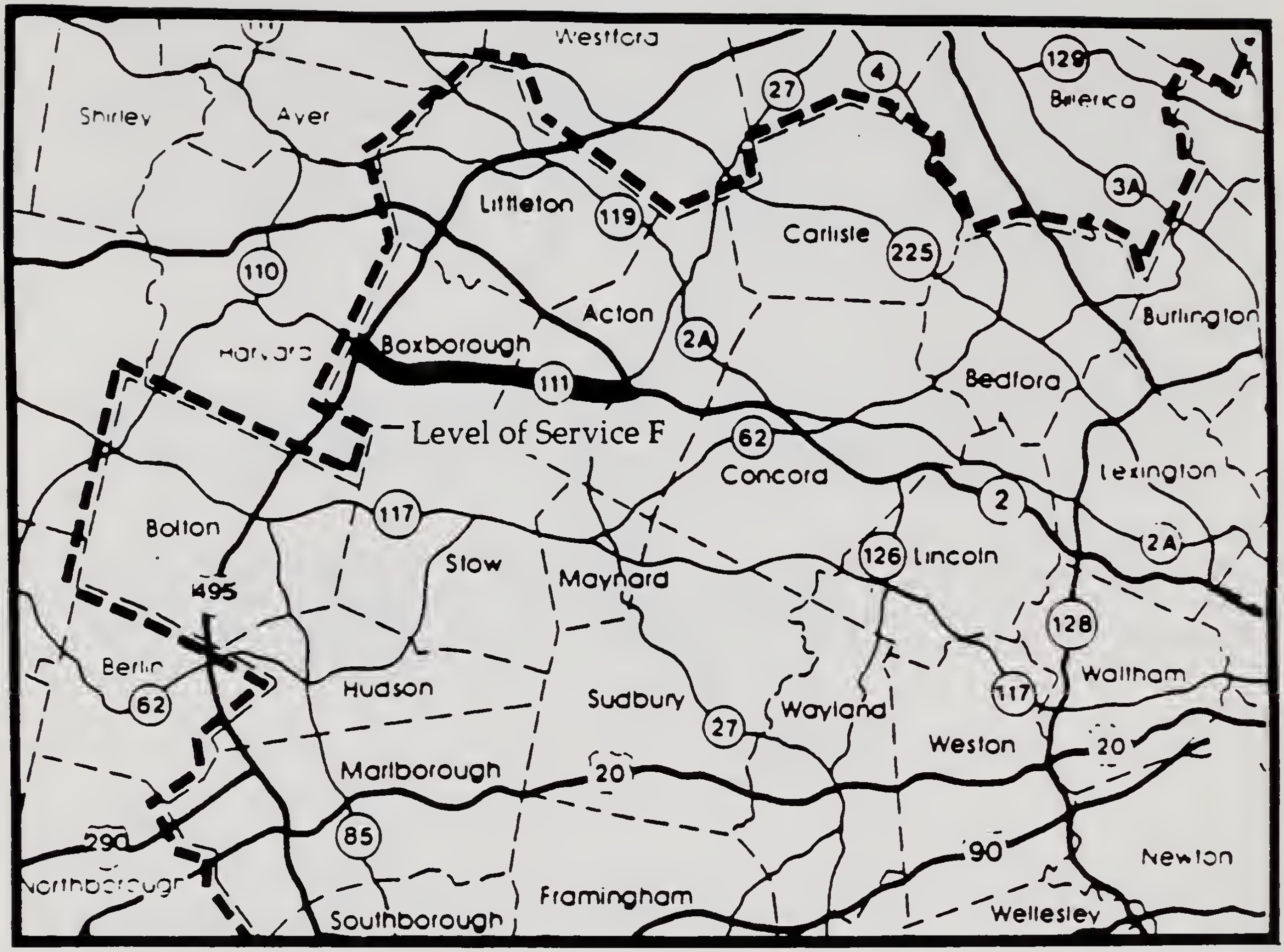


Exhibit 9
Route 111

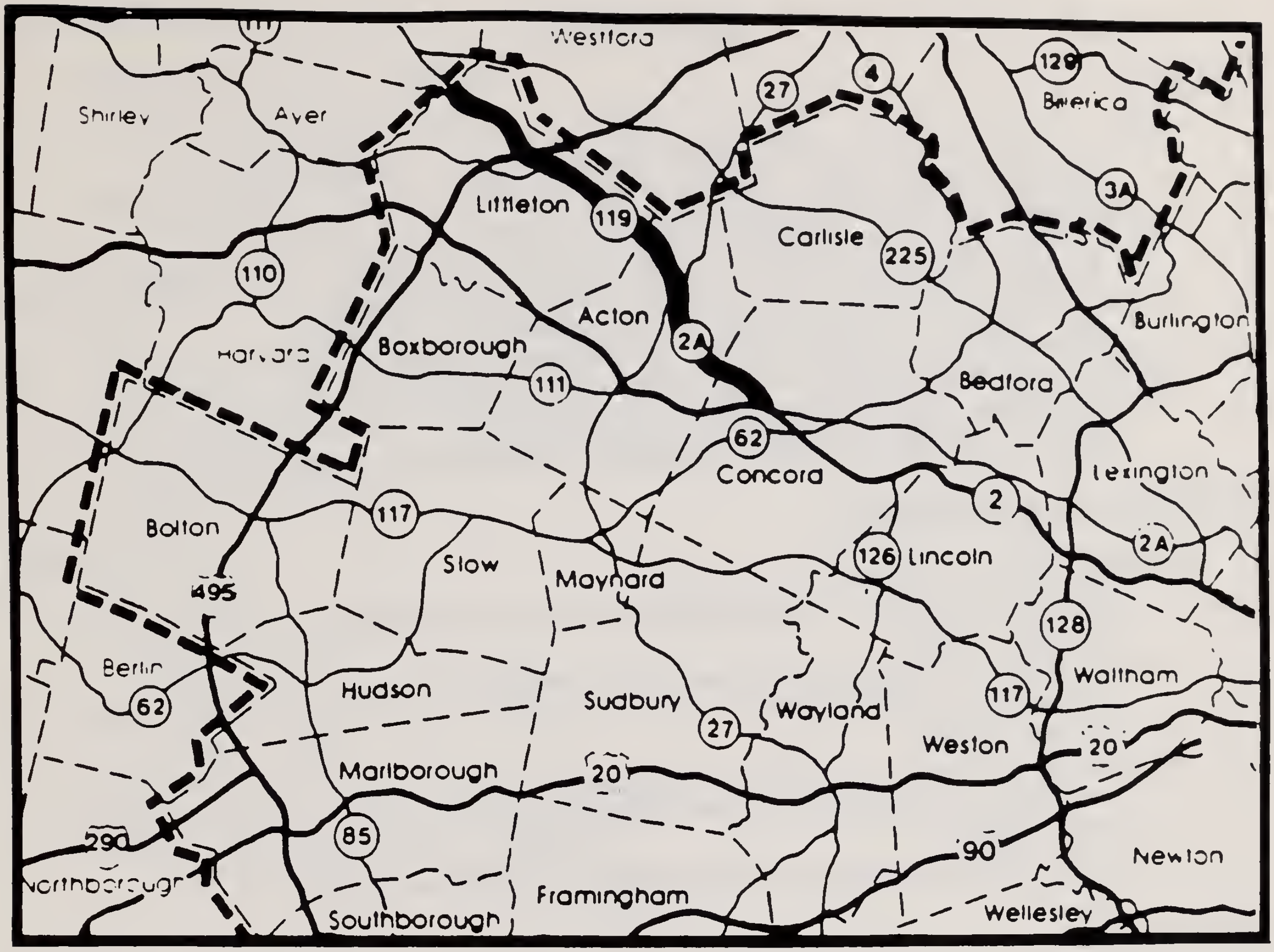


Exhibit 10
Route 119

MAGIC PROJECTS

Primary

- Rte. 2 from Rte. 111 to Crosby's Corner (Acton to Concord)
  - Safety improvements and reconstruction
  - Volume 33,550; Average Annual Accidents 9
- Rte. 2 from Rte. 110 to Route 111 (Acton, Boxborough, Littleton)
  - Highway Reconstruction and Bridge Reconstruction
- School Street and Weatherbee Street (Acton and Concord)
  - Reconstruction and Access to transfer station
- Route 20 at Nobscot Road and Union Ave. (Sudbury)
  - Widening, Channelization, Signalization
  - Volume 22,400; Average Annual Accidents 11.2; Level of Service D

Highway Bridge Replacement

- Route 2, Concord, over B & M RR
  - Bridge Reconstruction vicinity of Fairhaven Road
  - Volume 33,500
- Route 119 Great Road, Littleton, over BM RR
  - Bridge Reconstruction
  - Volume 8,730
- Sherman Bridge Road, Sudbury & Wayland
  - Bridge Reconstruction over Sudbury River
- Route 27, Acton
  - Bridge Reconstruction over Boston and Maine Railroad

Interstate 4R

- I-495 Marlborough
  - New Interchange between Routes 9 & 20
  - Volume 34,135; Average Annual Accidents 14
- I-290 Marlborough
  - Resurfacing
  - Volume 32,910
- I-495 Boxborough & Littleton
  - Resurfacing

Interstate Transfer

- Route 2 & Walden Street, Concord
  - Reconstruction
  - Volume 6,721; Average Annual Accidents 11.5

Non Federal Aid

- Marlborough Parking Garage
- Route 62, Concord
    - Bridge Reconstruction over Sudbury River
    - Volume 10,350
- I-495, Littleton
    - Bridge Repairs

Undetermined

- Route 111 and Mass. Avenue, Acton
    - Traffic Signals
- Route 2, Concord
    - Traffic Signals Route 2 at "ORNAC"
    - Volume 33,500

Urban Systems

- Boundary Street & Goddard Street, Marlborough
    - Volume 9,900
    - Reconstruction & Connect by existing cul-de-sec
- Route 117 at Haynes Road, Sudbury
    - Volume 1,900
- Union Avenue at Concord Road, Sudbury
- Concord Road at Pantry Road, Sudbury
- Route 20 at Peakham Road, Sudbury
    - Volume 17,700; Level of Service E

II. TRANSIT

The MAGIC subregion is served by limited transit opportunities. The available service being constrained to radial service on commuter buses or commuter rail to and from Boston.

The survey of MAGIC officials in 1988 revealed a desire for increased transit opportunities, especially to Route 128 locations. This being an unserved market at present.

Potential for transit services are, most likely, limited to privately sponsored services by employers or large shopping areas, targetted towards servicing employees and customers. These services often take the form of employer sponsored vans or "jitney" buses - passenger vans used to provide a transit service on a fixed, route or demand-response basis.

III. TOOLS FOR TRAFFIC MANAGEMENT

A. Introduction

This section of the report focuses on methods to manage traffic demand and make optimal use of the subregion's transportation network. This chapter is based upon the following MAPC reports:

> The Growth Management Catalog; A Compendium of Growth Management Techniques, November 1987;
>
> Trip Reduction Zoning with a Sample Application for the City of Cambridge, September 1988; and
>
> The Route 1 Corridor In Danvers: A Land-Use Study, April 1981.
>
> A Review of Local Planning Goals and Tools Available to North Shore Communities to Manage Traffic Growth, July 1989.

B. Land-Use Tools

Several land-use tools are available for managing traffic demand. The following discussion is a summary of some land-use tools that may be appropriate for traffic management.

1. Mixed Use or Planned Unit Development

Mixed use or planned unit development land use controls provide for a variety of uses and building types located in a development project including certain commercial uses in a residential development targeted to the needs of the residents.

Mixed use controls may also provide for including residential developments in nonresidential areas. These residential developments intend to meet housing needs of employees of the nonresidential development, thus improving pedestrian access to the nonresidential uses and reducing reliance on automobile travel.

Mixed use development may also contain mixes of nonresidential development. Some examples include provisions for day care facilities, small restaurants, doctor offices and other services aimed at the needs of employees located in an employment center.

2. Appropriate Land Use Densities

Travel habits are often dictated by the density considerations in local zoning; the result is that certain community goals, such as preservation of community character, may be contrary to other community goals, such as controlling traffic congestion. These sometime conflicting goals need not be mutually exclusive.

Local zoning should be reviewed to be sure that appropriate densities are addressed. Land-use tools such as cluster zoning, multifamily housing, transfer of development rights, and other tools may provide mechanisms for achieving local goals.

Recent MAPC research of appropriate densities for transit service has found that residential densities of about seven dwellings per residential acre, or 2400 people per square mile, may support local transit service. Increased densities above these levels may increase the use of transit. Similarly, employment densities are important to transit support. Employment densities exceeding 50 employees per acre and the total number of employees in the activity center exceeding 10,000, can increase the potential for transit use.

a. Cluster Zoning

Cluster zoning waives certain zoning requirements such as minimum lot sizes, frontage and setbacks to preserve open space. Application of cluster zoning intends to increase density on a particular portion of a parcel of land. A benefit of cluster zoning is an increase in density which may provide an opportunity to serve a site by transit service or shuttle bus service to popular destinations. Cluster zoning also lends itself to programs promoting a mix of affordable housing opportunities for people employed locally.

b. Multifamily Housing

Zoning to allow multifamily housing is an intentional step by a community to increase density. While this strategy could increase congestion, it could also have the opposite effect. Multifamily development may increase the ability for joint trip making by residents, increase the viability of transit service, promote a mix of affordable housing opportunities, and if strategically located, increase pedestrian accessibility. These are benefits of implementing multifamily zoning.

c. Transfer of Development Rights

The transfer of development rights separates the right to develop a property from the actual property. These rights are then transferable to other land parcels. The result of a transfer of development rights ordinance is the preservation of open space in some areas and the increase in density in others. The use of this ordinance provides the community with the ability to regulate appropriate densities, preserve community character and support transportation alternatives by clustering development in dense nodes.

d. Inclusionary Housing

Inclusionary housing programs exchange density increases or dimensional leniency for the provision of affordable housing opportunities. The increases in density would increase the potential for a supportable transit system and also provide housing opportunities for a mix of income levels resulting from local employment trends.

3. Design Strategies

Site design is an important method of influencing access choices for a property. Nonresidential development with ample available, free parking is more likely to be accessed by private, single occupant vehicles than would areas with restricted, or expensive parking. Nonresidential building clusters will provide for access strategies different than isolated structures. Site plan review strategies can influence how a property is accessed by employees and the viability of alternative commuter options.

a. Parking

Several strategies exist for addressing parking issues to manage traffic. These include setting up maximum parking standards for development, requiring preferential parking for car and vanpools, setting up a residential parking permit program to restrict on-street parking and setting up fringe parking strategies as a part of project approval.

i. Maximum Parking Strategies

Local zoning regulations quite often are designed to assure that parking is readily available for all employees who may choose to commute by car to work. Such zoning is not always responsive to the local highway network. Quite often zoning only sets a minimum number of spaces for a project and allows a project proponent to exceed this number without any controls.

Zoning can also set up a maximum number of parking spaces allowed a development project. This type of regulation can restrict site specific traffic. The adoption of a maximum parking cap forces a change in commuter habits and increase the viability of other commuter options.

ii. Preferential Car and Vanpool Parking

In Ridesharing in car or vanpools is the most readily available alternative to the single occupant vehicle. Unfortunately, this commute option is rarely considered in site design. Zoning ordinances and local officials undertaking site plan review may provide an opportunity for the success of ridesharing program by creating convenient locations for preferential car and vanpool parking.

Such areas may include sheltered parking spaces or ones next to a development front door. The site plan review may also require drop-off and pick-up areas for car and vanpools.

iii. Residential Parking Permit Programs

Residential parking permit programs, while not a local zoning tool, should be considered in combination with other parking tools. Parking permit programs are designed to restrict on-street parking in congested core areas. Such restrictions are important to reducing parking availability to commuters in areas served by adequate transit facilities but restricted roadway capacity. If a community adopts an ordinance restricting on-site parking, this type of regulation should also be considered.

iv. Fringe Parking Strategies

Fringe parking requirements are another option for project approval. These zoning provisions may be particularly responsive to dense central business district development. Parking for employees is not the most desirable use of land in the central business district. Zoning strategies could reduce parking in these areas in exchange for fringe parking locations served by a private shuttle bus system for employees.

This type of a zoning control must create areas for fringe parking as an allowed use, restrict the amount of on-site parking allowed, and require the creation of a fringe parking location.

b. Nonresidential Building Clusters

All too often local zoning provisions such as sideyard setbacks, buffer zones and parking standards result in new nonresidential areas consisting of isolated buildings surrounded by asphalt and buffer strips. These types of requirements reduce the viability of commute alternatives to a site. Alternatives to this standard type of zoning would relax controls within the nonresidential district. This would involve a relaxing of standards for setbacks and buffers between nonresidential uses while continuing to enforce buffers between residential and nonresidential uses.

Clustering of nonresidential structures will promote appropriate densities for transit services and alternatives to the single occupant vehicle.

c. Site Plan Review

The site plan review authority of cities and towns provides communities with an administrative procedure to influence site design. Such review provides the ability to ensure project compliance with design strategies that promote commute alternatives.

d. Curb Cut Consolidation

Access points to major highways are frequent areas of traffic congestion and for automobile accidents. Roadways with a minimum of access points perform at much better travel times than roadways with many points of access. Restrictions on future accesses and the consolidation of existing accesses to the major road system is one way for communities to improve roadway performance without significant roadway improvements.

Zoning ordinances and subdivision regulations may provide communities with some control over the points of access to the highway and local street network through regulating the number of access points allowed or restricting access points to reduce congestion on adjacent streets.

In 1988, the Massachusetts Department of Public Works tightened its curb cut policy by requiring increases in development density to resubmit their driveway permits for review. This requirement is an amendment to Chapter 61 of the Massachusetts General Laws which provides guidelines for all requests for access to state roads. The new policy strengthens the review powers of the state agencies over traffic consequences of new or expanded development.

e. Setback Requirements

Setback requirements are often an overlooked aspect of local zoning controls. These requirements usually regulate the distance from the edge of a roadway or right-of-way structures are allowed to be built. Small setbacks add to the neighborhood cohesiveness of some areas. However, the use of small setbacks on heavily travelled corridors often detract from the quality of life. Setbacks also affect the cost for highway improvements. Minimal setback requirements in a major corridor often lead to the need to remove buildings when additional land is needed for a highway improvement. This may make the cost of highway improvements prohibitive.

4. Trip Reduction Zoning

Trip reduction zoning establishes a procedure for granting permitted increases in project density in exchange for a project proponent's compliance to local standards for traffic reduction. The procedure sets standards for traffic reduction efforts by nonresidential development that request a special permit approval. The development proponent must develop a traffic management plan that identifies strategies to comply with the local ordinance. The proponent must monitor compliance with the management plan and, if necessary, propose additional efforts to reduce traffic.

5. Trip Reduction Ordinance

Trip reduction ordinances are similar in nature to trip reduction zoning, except they are targeted not only at future employment or commercial centers, but at all local development - present and future. The validity of such regulations are unclear at present. It is possible that the Home Rule Amendment of the Massachusetts Constitution may provide communities this tool as a means of protecting the health safety and general welfare. However, special authorizing legislation may be needed for a community to adopt a trip reduction ordinance.

6. Downzoning

Downzoning is a strategy that reduces the allowed development density. By reducing total density a community can effectively cap total traffic growth. However, such a zoning strategy may not be the best method of promoting commute alternatives. Downzoning should be used only in coordination with a program to set appropriate densities within a community.

7. Impact Fees

Impact fee systems can provide communities with a method for funding transportation improvements that serve development. The value of the impact fee would be equal to the value of the benefits derived by development from the improvement. While the impact fee would not regulate traffic volume, it can provide a means of managing congestion.

At present there is no specific authorization for impact fees in Massachusetts law. However, communities may wish to explore implementing an impact fee system through special permit procedures which exchange density for payment of the fee.

8. Special Assessment Districts

Chapter 80 of the General Laws provides communities the authority to use betterment assessments for capital improvements when a well defined area can be said to receive special benefit from an expenditure. The assessment is a share of the cost of the improvements; it cannot exceed the value of the benefit to a parcel of land; and the assessments are made after the improvements are completed.

The 1988 Transportation Bond Bill authorizes the Massachusetts Department of Public Works, in cooperation with local governments, to use betterments for transportation improvements. The Bond Bill set aside five million dollars for betterment projects.

9. MEPA Review Process

The Massachusetts Environmental Policy Act review regulations provide an opportunity for local and regional officials to review the impacts of large developments and provide direct input to the proposed mitigation. This review process requires all development seeking a state permit to file an Environmental Notification Form summarizing the potential impacts of a development project. From this stage it is determined whether further analysis is merited, and if so what type of analysis should be undertaken.

The scope for the study is developed through the review of local and regional agencies. This scoping allows officials the opportunity to identify the key problems that may be faced by a project. A regional review of these projects at this time can help ensure a regional approach to the overall environmental impact study and traffic impact report.

C. Non-Land Use Tools

Traffic demand management extends beyond simply implementing zoning controls. Strategies such as the residential parking permit program, discussed above, affect both existing as well as potential future traffic levels.

Non-land-use tools for consideration include setting up a commute coordinating service, and new and expanded transit service.

1. Commute Coordinating Service

Effective traffic management can be promoted through an entity taking the lead in promoting commuting alternatives. The formation of a Transportation Management Organization (TMO) to take the lead in such a venture can be very helpful in addressing traffic demand.

A TMO can help municipal officials and private employers coordinate commute alternatives. A TMO can also act as an areawide organization for car and vanpool matching services, work with individual employers to distribute commute information to employees, and contract private bus service for a group of cooperating employers.

TMO's may be formed either by public agencies or the private sector. To be most successful, private sector support at its outset is important.

Appendix A

	Level of Service	Traffic Volume	Annual Accidents
Route 2A			
At Route 27, Acton	F	17,538	---
From Merriam's Corner to Momument Square, Concord	---	9,850	6
Route 2			
From Route 111 to Crosby's Corner Acton to Concord	---	33,550	9
At Weatherbee Street, Acton	---	---	21
At Walden Street, Concord	---	6,721	11.5
At Reformatory Circle			
Interstate 495			
At Route 110 Interchange	F	---	30.0
From Route 20 to Route 90	---	34,135	14.0
Route 20			
At Hosmer St., Marlborough	D	24,450	19.0
At Hager St., Marlborough	E	18,150	19.0
At Nobscott Road, Marlborough	F	22,371	3.0
At Dudley Street, Marlborough	F	27,000	3.2
At Concord Street, Marlborough	F	22,800	17.0
At E. Main Street, Marlborough	D	24,450	9.0
Route 20			
At Union Street, Marlborough	E	20,180	---
At Phelps Street, Marlborough	E	22,800	12.0
At Wilson Street, Marlborough	E	22,800	43
At School Street, Marlborough	F	27,410	---
At Peakham Road, Sudbury	E	17,700	---
At Goodman's Hill Road, Sudbury	E	19,700	4.2
At Union Avenue, Sudbury	---	22,400	8.2
Route 62			
From Merriams Corner to Bedford Street, Concord	---	10,350	5.0
At Broad Street, Hudson	B	8,800	53
At Church Street, Hudson	---	8,800	6

Route 85			
At Park Street, Hudson	---	---	10.0
At South Street, Hudson	---	---	9.0
At I-290, Marlborough	F	25,000	4.0
From Hudson St. to Union St., Marlborough	E	14,458	5.0
At Main Street, Hudson	---	8,800	37
At Reservoir Street, Marlborough	E	12,660	---
At Broad Street, Hudson	F	6,710	---
Route 110			
At I-495, Littleton	E	---	30
At Stevens Street, Littleton	---	---	3
At Great Road, Littleton	E	---	9.0
Interstate 290			
At Route 85, Marlborough	F	28,240	4.0
From Fitchburg St. to Bolton St. Marlborough	D	32,910	---
At Solomon Road, Marlborough	E	24,940	---
Route 27			
At Route 2A, Acton	E	17,538	---
At Concord Road, Sudbury	F	---	---
Route 111			
At Arlington Street, Acton	---	---	13
At Interstate 495	F	11,060	---
At Central Street, Acton	E	11,100	---
Route 119			
At Route 110, Littleton	E	8,730	9.0

DF/emt
(Trans.-region)